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Your petitioners, **MERLE R. ELLIS** and **CLARENCE W. HALEY, JR.**, as citizens of the United States and as residents of the city of Summerfield, State of North Carolina, whose post office addresses are respectively 5575 US 220 North #12, Summerfield, North Carolina 27358 and 170 Shagbark Drive, Summerfield, North Carolina 27358, prays that Letters Patent may be granted to them for improvements in an **ANGLE MEASURING DEVICE AND GUIDE** as set forth in the following specification.

This is a continuation-in-part of and claims benefits under pending patent application Serial No. 10/427,002 filed 01 May 2003, now U.S. Patent No. _____.

TITLE OF THE INVENTION

ANGLE MEASURING DEVICE AND GUIDE

FIELD OF THE INVENTION

The invention herein pertains to a measuring device for use by carpenters and other tradesmen for measuring and setting angles and pitches and for marking cutting patterns.

DESCRIPTION OF THE PRIOR ART AND OBJECTIVES OF THE INVENTION

Tools and devices in recent years have greatly increased in complexity and price. Tools which have multiple purposes are becoming increasingly popular since a tradesman can more easily purchase and transport a single tool instead of two or three tools each having a single purpose. However, many multipurpose tools available today are bulky and inconvenient to handle. Some multipurpose tools provide several particular uses, but certain of these uses are very rarely needed, making them relatively expensive and providing little convenience. The measuring device can also be used in combination with a guide which is releasably attached thereto. The guide provides a

straight edge for consistent pattern marking when a series of uniform cuts are required such as when making a stair stringer. Thus, in view of the problems and disadvantages of conventional multipurpose measuring devices and tools, the present invention was conceived and one of its objectives is to provide a measuring device which is compact and will fulfill a variety of measuring requirements for a carpenter or other tradesmen.

It is still another objective of the present invention to provide a multipurpose measuring device which allows the user accuracy and flexibility in measuring angles and linear measurements.

It is yet another objective of the present invention to provide a manual measuring device which includes a level in combination with a protractor to measure or set pitches, gradients and the like.

It is still another objective of the present invention to provide a measuring device which will act as a square for ninety degree (90°) measurements or markings.

It is also another objective of the present invention to provide a measuring device which can be accurately pivoted and locked at any angle between zero and ninety degrees (0° - 90°).

It is still another objective of the present invention to provide a guide which can be attached to and used in combination

with the measuring device such as when a series of identical angle markings are needed.

It is also an objective of the present invention to provide a method for forming a series of angle cuts such as required in making a stair stringer.

It is yet another objective of the present invention to provide a measuring device guide which includes a pair of parallel longitudinal members which are resiliently attached at each end for clamping a preset measuring device.

Various other objectives and advantages of the present invention will become apparent to those skilled in the art as a more detailed description is set forth below.

SUMMARY OF THE INVENTION

The invention herein pertains to a measuring device, namely a multipurpose hand tool having a base pivotally affixed to a level. The level includes a rearward slot, proximate its pivot point for containing a protractor whereby the level and base can be pivotally adjusted accurately to any variety of degrees from zero to ninety (0-90) and locked thereat. When the level is pivoted to a ninety degree (90°) angle, the measuring device can be used as a carpenter's square or for other purposes. Uses of the measuring device also include, but are not limited to measuring the pitch of a roof, the grade of a road bed or other

surfaces. In addition, a ruler along one side of the base allows the user to take measurements as needed. The preferred length of the base of the measuring device is 15 and $31/32$ inches, thus allowing the tool to be used in setting wall or deck studs on 16 inch centers by providing approximately $1/32$ inch in width for applying a pencil mark.

In the measurement of a particular angle, the level is pivoted from the base, the angle is selected and a threaded locking member allows the base and level to be quickly locked in place. A scale on the protractor permits the desired angle to be measured. When closed, a locking tab on the front of the level engages a catch on the base to maintain the measuring device securely closed. Upon opening or pivoting the level, a storage compartment in the base is exposed for containing pencils or other small items for convenient storage.

A releasable guide is also included which can be adjustably placed on the measuring device. The guide includes a pair of spaced parallel tubular members which are joined at each end by a threaded member which passes through an over sized opening in the longitudinal members. A coiled spring surrounds each threaded member between the longitudinal member and provides resiliency thereto. A knurled nut on each threaded member allows for easy grasping and use. The guide is used in combination with the measuring device by placing it over the pre-opened measuring device and tightening it thereon by turning the knurled nuts. Once in place the combination measuring

device and guide can be placed on a wooden board or piece by placing a tubular member of the guide against the edge of the wooden piece as the measuring device rests atop the wooden piece. A pencil or other tool can then be used to mark along the outside of the measuring device to make a pattern, such as a "v" for use as a cutting mark. The combination tool can then be moved along the wooden piece and the "v" pattern repeated as needed. This method enables the user to produce uniform and precise measurement markings for cutting purposes such as required in making a stair stringer or other building component.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a left side perspective view of the measuring device of the invention with the level open approximately 45° from the base;

Fig. 2 illustrates the right side of the measuring device as shown in Fig. 1 with the level closed onto the base;

Fig. 3 demonstrates a left side view of the measuring device in a closed posture;

Fig. 4 features the measuring device in diminished form open ninety degrees (90°);

Fig. 5 pictures a front end view of the measuring device closed with the tab affixed on the catch;

Fig. 6 shows a rear elevational view of the measuring device as shown in Fig. 5;

Fig. 7 illustrates a top plan view of the measuring device as seen in Fig. 2;

Fig. 8 depicts a bottom plan view of the measuring device as shown in Fig. 7;

Fig. 9 demonstrates a top view of the base as seen along lines 9-9 of Fig. 4; and

Fig. 10 shows a top, rear, right end perspective view of the guide apart from the measuring device;

Fig. 11 demonstrates the bottom of the guide;

Fig. 12 illustrates a front view of the guide;

Fig. 13 features a top view of the guide as mounted on a measuring device;

Fig. 14 pictures the guide used with a measuring device to mark a wooden "2x10";

Fig. 15 shows an enlarged view of the guide and measuring device as seen along lines 15-15 of Fig. 14; and

Fig. 16 demonstrates the stair stringer as formed by the process shown in Fig. 14.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT AND OPERATION OF THE INVENTION

For a better understanding of the invention and its operation, turning now to the drawings, Fig. 1 demonstrates preferred measuring device 10 seen in perspective fashion having base 11, level 12 and protractor 13. As shown in Figs. 1, 2, and 7, slot 24 is defined by level 12 to accommodate protractor 13. Protractor 13 is rigidly mounted within base 11 such as by pins, frictionally fitting therein or with conventional glues or adhesives. Level 12 is also mounted to base 11 by hinge 15. Window 16 within level 12 is preferably formed from a transparent rigid plastic material such as a clear polycarbonate or polyacrylate and is affixed to level 12 as seen in Figs. 1, 3, and 4. Window 16 includes aperture 17 through which threaded locking member 18 is positioned. Locking member 18 passes through window aperture 17 of window 16 and slot 19 of protractor 13 whereby, effectively bolt nut 14, as seen in Fig. 2, is used to tighten threaded member 18 in place. Locking member 18 can be manually tightened to lock level 12 in any number of positions along scale 30 having line gradients 31, relative to base 11.

Level 12 as shown in Figs. 1 and 2, contains two (2) level elements 22. Level elements 22 are conventional, rectangular

and enclose level tubes 23 which are filled with a liquid having a movable air bubble for level measuring purposes as is standard. In Fig. 3, one level element 22 provides vertical level tube 23 and the other level element 22 provides a horizontal level tube 23' as with conventional levels. Thus by pivoting level 12 relative to base 11 through hinge 15 and with use of protractor 13, level 12 can be used as an angle or gradient finder to locate the pitch of a roof, or as a square with level 12 perpendicularly aligned to base 11 as seen in Fig. 4. Hence, measuring device 10 can be used by carpenters, roofers, masons and other tradesmen for a variety of needs.

As would be understood, level 12 can be locked to any desired pitch or gradient by manually tightening locking member 18. Similarly, by using scale 30 on protractor 13 any such pitch, gradient or the like can be relatively determined.

When used in a closed fashion as shown in Fig. 3, measuring device 10 can be used like a ruler for spacing wall or other studs on centers during construction phases. As shown in Fig. 3, measuring device 10 has a base with indicia 37 printed or molded thereon in the form of a conventional ruler. Base 11 in the preferred embodiment is exactly 15 and 31/32 inches in length for marking the position of building studs set on 16 inch centers. The 1/32 inch difference being allowed for a pencil mark on the wood or building material used.

To open measuring device 10 for measuring angles or the like, tab 34 as shown in Figs. 1 and 4 is pressed or flexed outwardly by a thumb or finger in the longitudinal direction of base 11 to thereby free locking tab 34 from catch 35 on base 11 as shown in Fig. 1.

As further shown in Figs. 1 and 9, storage compartment 40 is contained in base 11 and is sized to accommodate pencils or other small items. Storage compartment 40 includes pencil brackets 41 which will engage the shaft of a conventional wooden pencil to secure it in place for convenient access.

Preferred guide 50 is shown in Fig. 10 and includes top longitudinal member 51 and bottom longitudinal member 52 each having end caps 53. Longitudinal members 51 and 52 are preferably formed from tubular aluminum having a square cross-section. End caps 53 are preferably formed from plastic. Threaded members 55 act as a means to adjustably connect longitudinal members 51 and 52. Threaded members 55 have heads 57 as seen in Figs. 12 and 13 and pass through over sized (larger than the diameter of the threaded member) apertures in longitudinal members 51 and 52 at the ends thereof and are tightened in place by knurled nuts 56 as shown in Figs. 10, 11 and 12. Heads 57 are slotted for reception of a screw driver or other tool. As also seen in Figs. 10 and 12, resilient members 58, each of which consists of a coil spring, are positioned over threaded members 55 between longitudinal members 51 and 52 and provide resiliency thereto.

In Fig. 13, guide 50 is shown in typical mounting posture on measuring device 80. As would be understood, guide 50 can be used on other types of measuring devices other than measuring device 80 shown herein. Measuring device 80 is almost identical to measuring device 10 but includes two (2) indicator marks 81, one on each side of level 83 (only one shown in Fig. 13) which are placed exactly 12" (30.48cm) from bottom 82 of base 84 when level 83 is opened to a 90° angle with base 84 as seen in Fig. 13. Mark 81 provides a convenient point for aligning guide 50, such as when a 45° cut is needed. By placing guide 50 just under the 12" mark on base 84 and just under mark 81, a 45° angle is formed by measuring device 80. Protractor 90 as seen in Fig. 17 is attached to base 84 by two (2) metal pins 89 driven through and frictionally held within two (2) holes provided in base 84 and protractor 90.

Hinge 85 is also seen in Fig. 17. Hinge 85 is a five post hinge with two (2) fins integrally formed with base 84 and three (3) fins integrally formed on level 83. Pin 86 passes through holes (not shown) in each fin to maintain hinge 85 assembled.

Guide 50 can be placed at varying angles on measuring device 80 depending on the exact angle of cut desired. In Fig. 13, level 83 is pivoted to form a 90° angle with base 84 and is secured within guide 50 by rotating knurled nuts 56 as seen in Figs. 12 and 15. As would be understood, level 83 could be positioned at a 45° angle to base 84 or for another angle as

desired with guide 50 tightened thereon to maintain the desired angle during repeated markings as hereinafter explained.

The method of using guide 50 is seen in more detail in Figs. 14 and 15. Shown in Fig. 14, wooden piece or blank 60 consists of a conventional wooden "2x10" which is used to form a standard stair stringer 70 as shown in Fig. 16. In use, measuring device 80 is opened to a preset angle and guide 50 as shown in Fig. 13 is releasably affixed thereto. Next, measuring device 80 is placed against wooden blank 60 with guide 50 contiguous along edge 61. With longitudinal member 52 squarely against edge 61 as shown in Fig. 15 measuring device 80 is used as a pattern for marking along the outside of level 83 and base 84 as shown in Fig. 14 creating a "v" shaped pattern 65. V-shaped pattern 65 is repeated along wooden blank 60 by moving the combination of measuring device 80 and guide 50. These steps are repeated as necessary to form the proper number of patterns 65 therein. Once v-shaped patterns 65 are marked, saw 77 or another tool can be used to remove patterns 65 to form stair tread support 66 and riser support 67 as shown by stair stringer 70 in Fig. 16.

With another "2x10" wooden blank 60 an identical stair stringer to that of stair stringer 70 can be formed in a fast, efficient and accurate manner.

Once the desired number of stringers 70 have been formed knurled nuts 56 can be loosened releasing guide 50 from

measuring device 80. Measuring device 80 can then be folded and locked in place whereupon guide 50 and measuring device 80 can be stored for future use.

The illustrations and examples provided herein are for explanatory purposes and are not intended to limit the scope of the appended claims.